An investigation into the classroom interactions of twice exceptional students in comparison to their typically developing peers

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CONTENTS

ABSTRACT

Students who meet criteria for both being intellectually gifted and having a disability are known by the term 'twice exceptional'. To date there is little known about the classroom interactions of these students, and how these interactions impact their developing self-esteem. The interactions of four gifted primary school students with identified learning difficulties (twice exceptional) were observed along with four matched typically developing students and their teacher during normal classroom teaching activities. The number and type of positive, negative, neutral or no response interactions were recorded over four, one hour observation sessions. The Coopersmith Self-Esteem Inventory was then administered to the four twice exceptional and four comparison students. Results indicated that there was little difference between the twice exceptional and comparison students in terms of number of interactions recorded, with the twice exceptional students showing slightly more positive interactions with their teacher and peers. All four twice exceptional students reported lower self-esteem levels than their matched peers, with two students being in the low range. The results suggested that these four twice exceptional students were interacting in a manner similar to their typically developing peers, although they displayed lower self-esteem levels. The implications of these findings and recommendations for future research are discussed.

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CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

"I've got dyslexia… it's not very nice having everyone in the class be better than you"

Participant 1A's statement to a peer in his class as overheard by the researcher.

Recent developments in the field of gifted education have led to the identification of 'twice exceptional' students. These students are those who meet criteria for both high intellectual ability and also a disability, such as an academic disability or behavioural disorder. The concept of students having both intellectual giftedness and learning disabilities was first bought to attention by advocacy groups almost 40 years ago, with the first conference on 'gifted handicapped' children occurring in 1976 (Nielsen, 2002). Journal publication of case studies emerged during the 1970's with empirical research following during the 1980's and 1990's, including several early research reviews (Lovett & Sparks, 2013).

It is estimated that 1/6 of all gifted students also meet criteria for being twice exceptional, although this prevalence is thought to be conservative as the actual prevalence has been largely unstudied (Silverman, 1989). In one large scale study, the Twice-Exceptional Child Project, 3.5% of 22, 000 students attending special education services in the south-western United States were identified as being gifted with learning disabilities. This research project examined the learning experiences of students in public special education services over seven years (Nielsen, Higgins, & Hammond, 1993). The authors also

note that twice exceptional students can remain largely unidentified due to their average (or below average) academic performance. Many twice exceptional students perform in the 'average' range for their age; their intellectual abilities compensating for their learning or behavioural deficits (Nielsen & Higgins, 2005). This can be seen as dramatic strengths and weaknesses in the IQ profiles of twice exceptional students on cognitive assessment, often resulting in an average overall score (Silverman, 1989).

Definitions of what constitutes 'giftedness' have evolved over the last 60 years, with a historical focus purely on academic excellence as determined by IQ scores (McClain & Pfeiffer, 2012). The majority of states in North America now use the label 'gifted and talented' to refer to both existing and potential excellence in academic, creativity, leadership and physical spheres (Stephens & Karnes, 2000). There is a growing movement away from IQ testing alone as a criterion of giftedness, with greater emphasis being placed on multiple approaches to identification (McClain & Pfeiffer, 2012). Post-modern approaches to giftedness further distance themselves from categorical definitions towards a concept of talent development, where talent is seen as developmental potential that requires nurturing towards adulthood (Pfeiffer, 2012). While mainstream education has not fully embraced this position, there is a shift towards broader definitions of giftedness. A recent nationwide survey of 48 states in North America showed that over half used multiple cut-offs for giftedness assessment. This was usually the top 3-5% on a variety of measures (such as cognitive assessment or achievement testing) or the average of several such measures. Most states also recognise at least two areas in which a student can be gifted, rather than focusing solely on IQ scores, acknowledging that high ability is multidimensional (McClain & Pfeiffer, 2012).

The New Zealand definition of what constitutes gifted and talented includes an acknowledgment of both giftedness as high intelligence or aptitude, and talent as a high level of performance in creative or physical pursuits (Ministry of Education, 2013). This definition avoids specific criterion referencing of giftedness (such as test scores or percentiles), focussing on flexibility and broadness of approach. New Zealand has no national policy for the identification of gifted and talented students, instead providing suggested criteria to schools for them to develop their own definitions. It is emphasised that students can be gifted in a wide variety of arenas, with high intelligence being only one such area. As such, each individual school must develop its own set of characteristics that reflect how they view giftedness. This then becomes their resource for identifying such students in the future (NZ Ministry of Education, 2012).

Cultural definitions of giftedness are also apparent, as evidenced by a Māori medium talent and development initiative proposal supported by the Ministry of Education (2001). Comprehensive hui (meetings) with advisors of gifted education resulted in a drafted definition of giftedness that had relevance for Māori. This included broad views on what constitutes gifts and talents, and encompassed cultural concepts of giftedness reflecting tikanga Māori. These could include domains such as spirituality and leadership qualities, alongside more readily identified academic and sporting gifts (Herewini, Tiakiwai, & Hawksworth, 2012).

Twice Exceptional Students

There are several challenges that are faced by children who are identified as being twice exceptional. It is commonly reported that twice exceptional students experience

immense frustration within the school environment, due to the discrepancy between their intellectual potential and their academic performance. This is compounded by the fact that their disability may affect their testing performance thus preventing them from being accurately identified as gifted, denying them the opportunity to engage in academic instruction to meet their individual needs. Secondly, the compensation strategies twice exceptional students employ may prevent their academic performance from dropping below average, thus preventing them from meeting the criteria for a learning disability also (Nielsen & Higgins, 2005).

Another issue faced by students who are identified as twice exceptional is the tendency for an emphasis to be placed on behavioural management issues, rather than addressing their individual intellectual needs. Many twice exceptional students are only referred for special education testing on the grounds of behavioural difficulties, resulting from the mismatch between ability and performance (Nielsen, 2002). The Twice Exceptional Child Projects provided supporting evidence for this idea. In this study, the permanent school records of twice exceptional students were shown to contain twice as many references to disability than giftedness, suggesting a predominant teaching focus on weaknesses rather than strengths (Higgins & Nielsen, 2000). There is conflicting evidence as to whether adverse behaviours are more prevalent generally in gifted students, although highly gifted boys (with IQ's over 140) have been shown to have a similar rate of behavioural difficulties to students with learning difficulties (Shaywitz et al., 2001).

Gifted students with learning difficulties. Although a small amount of research has been published on the coexistence of giftedness with learning difficulties, the inclusion criteria for both constructs can differ between them. A recent review of 46 empirical articles

examining learning difficulties amongst gifted students found that there was no common criteria for the identification of either giftedness or learning difficulties, with the result that students who met researchers criteria for being twice exceptional in one study would not necessarily be identified as such in another (Lovett & Sparks, 2013). These authors raised questions regarding the validity of the entire twice exceptional concept due to the varying degrees of academic deficits and intellectual achievement found in this population, but other researchers stress the importance of considering intra-individual rather than inter-individual academic achievement in twice exceptional students to identify relative deficits (Foley Nicpon, Allmon, Sieck, & Stinson, 2011).

The issue of identifying learning difficulties in general can be approached from varying viewpoints, with the addition of giftedness only increasing the complexity of identification. There are currently no standardised characteristics of learning difficulties. Until recently, learning difficulties have been identified through an examination of discrepancy between intellectual ability (usually through IQ testing) and academic achievement. This method has fallen out of favour however, and has largely been superseded by a response to intervention approach (Lovett & Sparks, 2013). Response to Intervention (RtI) is a framework for the design and delivery of learning interventions which is based on four key components: evidence-based practice, progress monitoring, data-based decision making and mulitiered levels of intervention. Most RtI systems within schools involve three tiers of intervention; these are Tier I: Primary Prevention (which all students participate in), Tier II: Strategic Interventions (for the 10-15% of students with more intense academic needs) and Tier III: Intensive Interventions (for the 10-12% of students who did not response to Tier II interventions). This approach involves the student participating in increasingly targeted interventions, with a learning difficulty being identified only after

multiple interventions at Tiers I and II have failed to have an impact (Reschly, 2014). Although this approach is the most commonly used method of identifying and intervening in learning difficulties at present, it is not without its critics (Lovett & Sparks, 2013). The interaction between high cognitive ability and learning difficulties can mean that one or both constructs are unidentified in the early levels of intervention, with many twice exceptional students displaying overall average academic results (Crepeau-Hobson & Bianco, 2011). A review of 21 empirical studies of gifted students with learning difficulties found they displayed a wide variety in cognitive and academic achievement, meaning an identification profile of these students would be difficult to develop (Foley Nicpon et al., 2011). These complications can mean that gifted students with learning difficulties may not be identified until intermediate or high school (Ruban & Reis, 2005).

Several implications have been identified from the literature around resilience in gifted children with learning disabilities, including the importance of early identification of both exceptional abilities and learning disabilities (Dole, 2000). The twice exceptional student benefits from being viewed as gifted first with their disability of secondary concern; a strengths based approach is more constructive than focussing primarily on deficits to be corrected (Nielsen, 2002). This may not be the case in practice however, as demonstrated by the fact that students with high cognitive abilities and learning difficulties receiving less academic modifications than those with average or low abilities (Crim, Hawkins, Ruban, & Johnson, 2008).

Classroom Interactions

Success in the school environment is linked to competency within that social context (Hamre & Pianta, 2001). Given that the social context of the classroom environment contains two main areas, student-peer interactions and student-teacher interactions, these are the interaction types that will be focused on in this study.

Student-Peer Interactions in Giftedness and Learning Difficulties. It is well established that successful peer relationships are strongly associated with positive adjustment in the school environment (Buhs & Ladd, 2001). The quality of a student's peer interactions are particularly important during middle childhood, as over 30% of all social interactions are with peers at this age (Gifford-Smith & Brownell, 2003; Hay, Payne, & Chadwick, 2004). Peer acceptance and perceived peer support have been shown to predict how well students like attending school, with degree of school liking thought to significantly contribute to independent learning skills (Boulton, Don, & Boulton, 2011). School engagement has been shown to be associated with peer relationship quality and social support levels (Perdue, Manzeske, & Estell, 2009), while peer acceptance and inclusion in social networks are also considered a key component to children's overall emotional well-being (Gifford-Smith & Brownell, 2003).

The social experiences and competence of gifted students presents a mixed picture. Peer acceptance may be of concern to gifted students, with many feeling socially and intellectually isolated within the classroom. This sense of isolation may arise from characteristics associated with giftedness, such as perfectionism and sensitivity or intensity, in addition to social skills that may lag behind their intellectual development (Smith, Dempsey, Jackson, Olenchak, & Gaa, 2012). In one study, a sample of 1465 North American

gifted students aged 14-18 years (with a mean age of 15 years) attending a four week residential summer holiday programme for gifted youth were asked to complete a Student Attitude Questionnaire on completion of the programme (Cross & Coleman, 1993). The authors reported on the "social experience of giftedness", with questions in this section asking the students to note how others perceive them and how they perceive themselves in relation to their peers. Over two thirds of the sample reported their peers viewed them as different, and the majority felt their teacher viewed them as different to their peers also. The fear of stigmatisation was seen to impact the student's social interactions by limiting their efforts to interact with their peers. While these findings are of interest, due to the method used in obtaining this information, it is not clear whether this result is an accurate reflection of the gifted student's social interactions.

It is unclear to what extent reports of social isolation and/or rejection amongst gifted students are coloured by the tendency towards perfectionism and hypersensitivity commonly associated with giftedness (Smith et al., 2012). These students may experience the same developmental challenges as typical students (such as obtaining peer acceptance), but their subjective experience of these challenges may be qualitatively different (Peterson, 2009). This is supported by the fact that although gifted students tend to rate themselves as less popular with their peers than typically developing students, there is tentative evidence that gifted students may be in fact rated by their peers as more popular. This could be in part due to the gifted student's tendency to perceive social success as more reliant on ability and effort, rather than luck (Bain & Bell, 2004). For the reasons identified above, it is important that direct observation of the classroom interactions of these students is conducted. This may be the only way to ascertain whether there are actual differences in their social interactions as compared to their typical peers. It may be that gifted students

utilise deliberate positive social strategies in their peer interactions, such as humour and sensitivity to peer needs. Giftedness may be of social advantage or disadvantage it seems, depending largely upon self-perceptions of peer interactions (Barber & Mueller, 2011).

Students with learning difficulties can struggle with peer relationships in the school environment. A meta-analysis of 153 studies involving social skill deficits amongst students with learning difficulties, showed that 75% of this population were considered to have social difficulties with their peers and teachers in comparison to typical students (Kavale & Forness, 1996). In a study of 77 students aged 5-18 years with learning difficulties (with a mean age of 11.3 years), peer victimisation was correlated with reports of maladaptive psychosocial responses such as withdrawal, anxiety, and social and attention problems (Baumeister, Storch, & Geffken, 2008). Students with learning difficulties are more likely to be socially rejected by their peers, with peer acceptance tending to decline over the course of the school year (Wiener, 2004). In fact social skill deficits are so endemic amongst students with learning difficulties, that this is now thought to be one characteristic that differentiates those with a learning difficulty from those with other learning problems (Vaughn, Haager, Hogan, & Kouzekanani, 1992). This highlights the importance of identifying students who are at risk of poor peer relationship development, as the outcomes of peer victimisation and rejection can be far reaching. Risk models for peer rejection in these students propose that the cognitive deficits involved in learning difficulties are also associated with social and communication deficits, making the formation and maintenance of peer relationships more challenging (Wiener, 2004). Although this may be a simplification of complex social processes, it remains that students with learning difficulties consistently demonstrate lower peer popularity and higher levels of peer victimisation than typically developing students (Kavale & Forness, 1996).

Student-Peer interactions of twice exceptional students. There has been very little research on the social characteristics of twice exceptional students, but the potential for maladaptation has been discussed. The experience of social isolation or rejection in students with giftedness or learning difficulties could potentially be compounded in the twice exceptional student, negatively impacting on developing self-perception (Barber & Mueller, 2011). Twice exceptional students may have difficulty identifying with their peer group at school, as they share characteristics with many populations (gifted/talented, learning disabled and typical students) but also fundamentally differences. This may impact on how social relationships are formed, as twice exceptional students report the need for peers to have similar levels of ability for positive relationship development (Trail, 2008). Like gifted students, twice exceptional students may feel socially isolated at school, unable to relate confidently with any of their peers within the typical classroom (Nielsen, 2002). This is demonstrated by the fact that teachers perceive gifted students with learning difficulties as less socially competent and at higher risk of peer rejection than their gifted peers (McEachern & Bornot, 2001). Although the potential for maladaptive social relationships has been briefly discussed in the literature, there remains very little research in the area of twice exceptional peer interactions in the school environment.

Student-Teacher interactions. Student-teacher interactions are a powerful social process that can directly contribute to positive academic, social and emotional development (Luckner & Pianta, 2011). A student's relationship with their teacher is especially important for classroom social adjustment in the primary school years. Teachers model a range of important skills, including effective communication and prosocial peer interactions, with a positive teacher-child relationship increasing the learning opportunities a child is exposed to (Hamre & Pianta, 2001). Kindergarten teacher's reports of their relationships with students

were found to predict negative academic and behavioural outcomes at the eighth grade, even when other early indicators (such as cognitive functioning and classroom behaviour) were controlled for. An early negative relationship, characterised by conflict or dependency, was shown to be a key indicator of future school difficulties, perhaps due to a decreased ability to access instructional and social resources (Hamre & Pianta, 2001). Teacher-student closeness in first grade has been related to increased psychosocial adjustment over the next three school years (Buyse, Verschueren, Verachtert, & Van Damme, 2009), with emotionally supportive interactions positively influencing future prosocial peer interactions (Luckner & Pianta, 2011).

There is a scarcity of research around the interactions of teachers with students who are either gifted or have a learning difficulty. What little there is suggests that teachers tend to see gifted students as more introverted and less emotionally stable than their typical peers, an association that is not in line with empirical evidence (Baudson & Preckel, 2013). This perceived difference in social and emotional functioning could potentially impact on how teachers interact with gifted students. Teachers have been found to have more interactions with gifted students than their peers within the classroom, with gifted students receiving proportionately more teacher attention than the rest of their class (Maltby, 1983). Maltby (1983) observed the teacher interactions of 39 gifted students across 24 first and middle school classrooms for approximately one week each. Their high levels of teacher-interactions were often student initiated, especially as students entered middle school. She concluded by suggesting that having gifted students in a mainstream classroom could be disadvantageous for the other students in terms of loss of teacher contact time. There is even less research around students with learning difficulties, but there is tentative evidence that teachers may hold pessimistic expectations of students with LD, potentially reducing

their self-esteem, sense of competency within the classroom and future motivation to achieve (Clark, 1997). As there is very little research in the area of student-teacher interactions of students who are gifted or who have learning difficulties, there is a requirement for more observational studies to determine whether these populations differ from their peers in terms of the frequency and type of their teacher interactions.

Student-Teacher interactions of twice exceptional students. There appears to be a lack of research in the area of twice exceptional students' interactions with their teachers, with no studies being identified at this present point in time. It remains to be seen how the negative perceptions teachers may hold about students with LD interferes with the more attention demanding learning style of gifted students.

Self-Esteem

Although there is no universally accepted definition of what self-esteem actually is, it is generally agreed that positive self-esteem consists of a feeling of 'self-appreciation' (Hosogi, Okada, Fujii, Noguchi, & Watanabe, 2012a). Self-esteem can be seen as how an individual feels about their constructed explanatory concept, created to understand the self as a distinct entity (Houck, 1999). This description of self can then be evaluated against internal and external standards. Houck (1999) theoretically discriminates this conception from self-concept, in that self-concept involves descriptive knowledge about oneself while self-esteem involves emotion evaluation. This separation between cognition and affect is not precise however, and there is significant cross-over between what each construct purports to define. Thought and emotion are intrinsically linked, so efforts to theoretically define each separately may not be practically viable. An Australian study looked to

determine the relationship between self-esteem and self-concept through descriptive and evaluative self-reports among 957 Australian children aged 7-13 years. The authors showed that even though the two statement types could be separated by factor analysis, there was a high level of homogeneity (0.81) and correlation (0.62) among the items. This finding suggests that though self-concept and self-esteem can be defined separately in theory, cognitive and affective items perhaps should not be considered as separate constructs in practice (Burnett, 1994). For this reason in this study the terms 'self-concept' and 'self-esteem' are used interchangeably to refer to both the processes of emotive and cognitive self-evaluation, using 'self-esteem' predominantly as this is the most widely known term.

Self-esteem can be considered a result of the evaluation process of weighing one's life successes against one's failures (Hosogi et al., 2012a). This evaluation is strongly dependent on the social context of the child, with relationships with teachers and peers becoming particularly important by school age (R. Shavelson, J. Hubner, & G. Stanton, 1976). High self-esteem is associated with a variety of positive factors, such as independence, responsibility, frustration tolerance, resistance to peer pressure, and willingness to attempt new skills or tasks (Ferkany, 2008). Conversely, low self-esteem is a risk factor for a range of maladaptive psychosocial outcomes, including poor mental health, substance abuse and antisocial behaviour (Robins, Trzesniewski, & Donnellan, 2012). Ferkany (2008) argues that building children's self-esteem is a crucial responsibility of the school, as this increases students confidence and motivation to learn. Supporting the development of positive self-concept is important during the primary school years, as increased reliance on peer approval and acceptance may limit adolescent interventions in this area (Dole, 2000).

Positive self-esteem in childhood relies upon an accumulation of successful life experiences at home, school, and in the community. It is critical that children develop an adequate level of self-esteem, as reduced levels are associated with future psychological and social difficulties (Hosogi, Okada, Fujii, Noguchi, & Watanabe, 2012b). The quality of a student's interactions at school also has an important impact on their developing self-esteem. Teacher-student interactions that provide a high level of emotional support have been shown to increase social competence with peers (Luckner & Pianta, 2011), with peer acceptance being an especially powerful factor for positive self-concept in twice exceptional students (Barber & Mueller, 2011). Positive teacher interactions may prove to be particularly important for twice exceptional students, as those at risk for poor peer interactions may lack the internal resources to assist them in initiating and maintaining peer relationships (Luckner & Pianta, 2011).

Gifted students. Gifted students have been shown to report a more positive global self-concept than their typically developing peers. A meta-analysis of 40 articles examining the self-concept of gifted students showed higher global self-concept ratings, with academic and behavioural perceived competence rated significantly high (Litster & Roberts, 2011). Although global self-concept scores were generally high, gifted students rated their competency as significantly lower than their non-gifted peers in the domains of athleticism and physical appearance. This suggests that even though gifted students may benefit from a positive self-concept in regards to their academic performance and behaviour, they may still be challenged by a poor physical self-image. The differences between self-concept of gifted and non-gifted students also showed developmental trends; the gap between the two populations tended to widen with increased age. This indicates that self-concept development becomes increasingly important as children age, perhaps due to an

increasingly sophisticated cognitive ability for accurate peer comparison (Litster & Roberts, 2011).

The positive global self-concept scores seen in gifted populations could be influenced by successful peer relationship strategies (Barber & Mueller, 2011) and/or the high degree of teacher interactions (Maltby, 1983) evident in this group. Gifted students can still benefit from support in developing a healthy self-esteem, especially in the areas of physical and athletic domains where they may rate themselves more poorly than typically developing students. Increasing self-esteem leads to an increase in resilience factors for gifted students, such as motivation and an internalised locus of control (Dole, 2000).

Students with learning difficulties. Students with learning difficulties generally display lower global self-esteem scores than their typically developing peers. An Italian study of 56 students aged 7-9 years showed that those with specific learning difficulties (dyslexia, reading comprehension or maths) reported significantly lower self-esteem than those who showed no difficulties. These children were also more likely to use self-defensive strategies (such as returning homework late as an excuse for poor performance), indicating they felt the need to protect their self-concept within the classroom environment (Alesi, Rappo, & Pepi, 2012). It is not surprising that it is the domain of academic self-concept where students with learning difficulties differ the most from students without, while their global self-esteem score is reliant on perceived abilities in non-academic domains (Cosden, Elliott, Sharon, & Kelemen, 1999).Students with learning difficulties also tend to be socially unsuccessful with their peers (de Boo & Prins, 2007), and their teachers can hold pessimistic perceptions regarding their academic abilities (Clark, 1997). These factors are thought to contribute to the low self-esteem scores these populations tend to report (Alesi et al., 2012;

Houck, Kendall, Miller, Morrell, & Wiebe, 2011), with a negative cumulative effect becoming apparent over time.

Interestingly, the self-esteem of students recently diagnosed with a learning difficulty has been shown to increase following identification (MacMaster, 2002). The authors argue that this increase in self-esteem could be due to the students' perception that their academic problems are limited in scope, that they are definable and perhaps manageable. This suggests that the early identification and management of learning difficulties, in addition to emphasising successful non-academic domains, could have a positive impact on developing self-esteem.

Twice-exceptional students. There is very little research surrounding the self-esteem of twice exceptional students (Foley-Nicpon, Rickels, Assouline, & Richards, 2012), and no studies identified that examine how classroom interactions could impact this developing conception. Twice exceptional children need supportive and challenging environments at home and school to develop positive self-concepts (Dole, 2000). Frustration and confusion with academic and social challenges can mean twice exceptional students are at a higher risk of developing affective disorders, anger, or a sense of failure and worthlessness (Nielsen, 2002).

Internalised negative feelings can lead to an increase in externalising behaviours, such as aggression and hyperactivity in twice exceptional students (Foley Nicpon et al., 2011). A study of 24 gifted students with learning disabilities (aged 8-12 years) found that this group rated themselves lower than matched controls on all self-concept factors measured by the "How I Feel About Myself" Children's Self-Concept Scale – behaviour, intelligence, appearance, anxiety, popularity and happiness (Waldron, Saphire, &

Rosenblum, 1987). This finding suggests that twice exceptional students may demonstrate lower self-concept scores across multiple domains, not just those related to academic frustration.

Barber and Mueller (2011) compared the self-concept of typical, gifted, learning disabled and twice exceptional students as part of the National Longitudinal Study of Adolescent Health (AddHealth). This large study in the United States (*n* = 12,105) asked students in grades 7-12 to rate their self-concept, maternal relationship and sense of school belonging through home administered interviews. Students were identified as gifted if their scores were above 120 (above 90th percentile) on the AddHealth version of the Peabody Picture Vocabulary Test. They were considered to have a learning disability, including attention disorders or specific learning disabilities, if their parent had reported this was the case on initial screening. Ninety students were identified as being twice exceptional according to this criteria. These students were shown to have significantly poorer self-concept than gifted or typical students (at a similar level to students with learning difficulties), although school belonging scores did not differ between the groups. The authors found that maternal support strongly moderated self-concept amongst gifted and learning disabled students, but this association was much weaker in the twice exceptional students. This suggests that twice exceptional students may have a more negative maternal relationship than either gifted or learning disabled groups, with their home environment being viewed as less supportive. These results could imply that the support of teachers and peers in the school environment may be especially important in the development of positive self-concept in twice exceptional students.

Rationale and Research Questions

How does a gifted student with learning difficulties interact with their peers and teachers? It is thought that the advanced intellectual capacities of twice exceptional students can compensate for a certain amount of deficit caused by academic difficulties(Nielsen & Higgins, 2005), but does this compensation extend to social interactions? This study addresses these question by observing the peer and teacher interactions of twice exceptional primary school students, discussing the potential impact of positive and negative interactions on developing self-esteem. Much of the research in the area of twice exceptional students has focussed on gifted students with learning difficulties, with an increasing body of knowledge regarding the unique challenges these students face within the school environment (Barber & Mueller, 2011). For this reason this particular group is the focus of this research project.

Self-esteem among primary school children is significantly influenced by both teacher and peer interactions. Research also suggests that students with learning difficulties display lower scores on global self-esteem measures. Gifted students in contrast, have higher self-esteem scores but tend to report lower competencies in physical arenas. The purpose of this research was first, to compare peer and teacher interactions across twice exceptional students and their typically developing peers, and secondly, to examine how the characteristics of both giftedness and LD interact to influence the self-esteem of twice exceptional students. Specifically this study examined:

1. How do the number and type of classroom interactions of twice exceptional primary school students compare to their typically developing peers?
2. How do the number and initiator of student-peer interactions of twice exceptional primary school students compare to their typically developing peers?
3. How do the number and initiator of student-teacher interactions of twice exceptional primary school students compare to their typically developing peers?
4. How do twice exceptional primary school students rate their own self-esteem, and how does this compare to their typically developing peers?

CHAPTER TWO

METHOD

Ethical Approval

Ethical approval for this research project was sought and provided from the Educational Research Human Ethics Committee at the University of Canterbury in March 2014. Individual information and consent forms were prepared for participating students, parents/caregivers, teachers and school principals (refer to appendices A to D for the invitation to participate in the research, information and consent forms, and initial interview questions). The consent forms informed the participants that the researcher would be observing and recording normal classroom behaviour, accessing academic records, and administering a brief self-esteem inventory to student participants. The participants were assured of their confidentiality, privacy and right to withdraw their participation at any point.

Research design

This research project followed a non-experimental research design, as no variables were being manipulated. A quantitative descriptive approach was used, in which observational data regarding twice exceptional students and their typically developing peers was examined and contrasted. A research design of this type is especially useful to describe phenomena when there is very little research in an area, and can provide an indication of whether further research would be warranted. Descriptive studies examine complex social

phenomena in an applied setting, with participants selected as they possess desired characteristics (Dulock, 1993). Classroom observations have been demonstrated to show consistent validity of global measures (Hoge, 1985), such as the categories proposed in this research project.

The observation procedure used was originally developed in New Zealand (Rietveld, 1989). It is recommended that existing observation schedules should be used wherever possible when conducting classroom observational research, as this serves to maximise time efficiency, improve reliability and validity and moves towards developing standardised research methods in this area (Hoge, 1985). This procedure was originally developed with the New Zealand primary school in mind, and was used to contrast children with special education requirements with their typically developing peers. Another research study has successfully used this protocol to examine teacher, teacher aide and peer interactions with students with special education needs (Chadinha, 2013).

Recruitment and Consent Process

Participant recruitment began in April 2014. The Gifted Education Centre was initially approached by email to determine whether they would be aware of any twice exceptional students and their parents who may consider participating. This association was chosen for participant recruitment as membership requires formal identification of giftedness. The teaching staff associated with this organisation also had extensive experience in identifying gifted students with learning difficulties. On expression of interest from the Gifted Education Centre, they were provided with information sheets outlining the research project for them to distribute to their parental members.

Parents who were interested in the research project contacted the researcher by email or telephone, and were given information sheets (both the parental and student version) outlining the purpose and general procedures that would be involved if they chose to participate.

Participant eligibility. Students were eligible to participate in the project if they met the following inclusion criteria: (a) were aged between 5-12 years, (b) attended a primary school within a wider metropolitan area, (c) were recognised as being gifted by their school (and through formal testing if available), (d) were recognised as having significant learning or behavioural difficulties by their schools (and through formal testing if available), and (e) spoke English as their first language. Students with a diagnosis of Autistic Spectrum Disorder (ASD) were excluded from this project, as the social communication deficits associated with this disorder (American Psychiatric Association, 2013) could impact on the classroom interactions to be observed.

Participants

All of the twice exceptional participants in this research project attended an educational programme in a major New Zealand city, run by The Gifted Education Centre. As part of the assessment procedure for attending this programme children undertake a standardised cognitive assessment, the Woodcock Johnson Test of Cognitive Abilities III (Woodcock, McGrew, & Mather, 2001). Only those formally identified as gifted could attend the programme, meaning all participants have the potential to perform in the top 5% of their area of ability (The Gifted Education Centre, 2014). Additional information was obtained through parental interviews and the examination of academic records in order to

confirm that the participants had a learning disability in addition to being identified as gifted. All of the twice exceptional participants had previously undergone formal cognitive assessment with a psychologist specialising in gifted children. For each participant, their cognitive profiles suggested significant disparities between areas of functioning. They all expressed some degree of difficulty with reading and/or written expression incongruent with their academic abilities. Careful examination of discrepancies between all the indexes and subtests included in the cognitive assessment process is required to determine relative strengths and weaknesses that could indicate a learning difficulty. This type of cognitive profile analysis is especially important for twice exceptional students, as their pattern of cognitive strengths in relation to their weaknesses can be dramatic (Assouline, Foley Nicpon, & Whiteman, 2010).

The participating twice exceptional students' most recent PAT stanine scores are shown below in Table 1.

Table 1

PAT Stanine Scores of the Four Participating Twice Exceptional Students

Student	Date of PAT	Reading comprehension	Vocabulary	Listening comprehension	Punctuation & grammar	Maths
1a	March 2014	3 *(4)	-	-	-	-
2a	March 2014	8	7	-	6	8
3a	February 2014	5	-	6	-	7
4a	February 2014	6	-	5	-	6

Note. Stanine scores range from one to nine, with an average of five

* Participant 1a's reading comprehension stanine score increased to 4 (from 3) when the test was read to him. No other information was available due to his being absent from testing.

A contrast student was chosen from the twice exceptional students' classrooms in collaboration with the classroom teacher. This was achieved by going through the classroom attendance roll with the teacher, and choosing the first name following the twice exceptional student who matched them on gender, age and approximate reading ability. Similar reading abilities between the twice exceptional and comparison students were chosen to ensure that both students were in physical proximity to each other during the observations, and that the frequency and type of learning assistance they required from their teacher would be approximately the same. The comparison students chosen had no identified learning or behavioural difficulties, and were considered as performing with the typical academic range for their age by their teacher. Each comparison student and their parent were provided with an information sheet about the research project, and returned their signed consent forms to their teacher before observations began.

School 1 participants and setting. Participants 1A (twice exceptional student) and 1B (comparison student) attended a small decile 10 full primary school (Years 0-8) in a semi-rural setting. Teacher 1 graduated with a Bachelor of Teaching and Learning three years ago, and had been teaching at School 1 for the past two years. Participant 1A was a Year 5 male of New Zealand European descent aged 9 years and 9 months. He stated that he found his regular school "boring", as he did not get the opportunity to spend time doing what he enjoyed. Participant 1A liked the creative activities and Kapa Haka at his regular school, but found reading and writing activities difficult. This was evidenced in his PAT reading comprehension stanine score of 3 (this increased to stanine 4 when he was allowed a reader for the test). His mother stated that she had no concerns about participant 1A's social development, but his self-confidence was beginning to be affected by his perceived inability

to reach his own academic standards. She attributed this to participant 1A being a "perfectionist", and that he felt like a failure at times when he did not meet his often unrealistic standards.

School 2 participants and setting. Participants 2A (twice exceptional student) and 2B (comparison student) attended a decile 10 primary school, situated within an affluent area of a major New Zealand city. This school had a roll of 500-600 students, and catered for Years 0-6. Teacher 2 had been teaching for 36 years after receiving a Bachelor of Teaching and Learning, and was working towards a Master of Education at the time of the study. She had been teaching at School 2 for 14 years. Participant 2A was a year six male of New Zealand European descent, aged 10 years and 4 months. He enjoyed maths, science, drama and art at his regular school, but indicated that reading and spelling were areas where he had difficulty. Participant 2A required a 'reader' at school to access some of the curriculum, and his mother expressed concern that his academic results were not reflective of his true ability without this support. She noted that participant 2A's difficulty with spelling impaired the fluency of his writing, and that his reading and writing difficulties impacted on how independently he could complete tasks such as homework. Although participant 2A's reading comprehension was above average on PAT testing (stanine 8), his punctuation and grammar was lower (stanine 6). Participant 2A's mother was unsure as to how well he was keeping up with the curriculum, and uncertain how to support him at home with this. She stated that participant 2A's self-esteem levels had notably decreased from around Year 4, with frequent emotional responses to perceived academic failure (calling himself "stupid" and "useless"). Participant 2A spoke of a number of friends both at his regular school and the gifted education programme he attended, and his mother commented on his excellent social skills.

School 3 participants and setting. Participants 3A (twice exceptional student) and 3B (comparison student) attended a decile 10 full primary school with a roll of approximately 475 students, situated in an affluent city suburb within New Zealand. Teacher 3 had a Diploma in Teaching (Distinction) and a Bachelor of Teaching and Learning. She had been teaching for 23 years, 17 of which were at School 3. Teacher 3 had been the Team Leader of Years 5-6 at School 3 for the past 9 years. Participants 3A and 4A were fraternal twins, with both boys being accelerated to the year level above (from their age appropriate Year 4 class to Year 5). Participant 3A was aged 9 years and 2 months at the time of observations, and was of NZ European descent. He stated that he enjoyed school this year, as he had the opportunity to learn in a self-directed manner. Maths and reading were areas he felt confident in, but he spoke about how he had difficulty communicating events in written form. Participant 3A's reading comprehension PAT stanine score of 5 suggests he was performing in the average range for his accelerated age group, although his processing speed had been identified as being below average on formal testing. His mother stated that he had experienced significant emotional difficulties following the 2010/2011 Christchurch earthquakes, and was diagnosed with post-traumatic stress disorder (PTSD) at this time. This had an impact on his learning and anxiety levels at school, but substantial improvement in both had been noted since the beginning of the year. He stated that most of the boys in the class were his friend, and his mother commented on how he had developed strong social networks around himself.

Participants 4A and 4B attended the same school and classroom as participants 3A and 3B. Participant 4a was also aged 9 years and 2 months and of NZ European descent, as he is the twin of participant 3A. He stated that he loved maths at school, and was also confident in reading. Participant 4A's PAT stanine scores of 5-6 suggest he is performing in

the average academic range for reading and maths. Written expression was something he found difficult in the classroom, identifying that coming up with ideas for writing was challenging ("ideas muddle in my head"). His mother emphasised how writing anything had become almost a phobic experience for participant 4A, with him becoming very frustrated when attempting to write. She felt that this frustration was borne out of his high expectations of himself and strong competitiveness, and expressed concerned that he was beginning to show physical expressions of anger and frustration. Participant 4A did not identify any particular relationships with his peers, but stated that he was friends with a range of people in his class.

Measures and Materials

The following measures were used in this research project. The Childhood Autism Rating Scale: CARS (Schopler, Reichler, & Rochen Renner, 1988) was administered to the parents of the four twice exceptional students during the initial interview, to exclude those students with clinical levels of autistic symptoms. Excluding those students with symptoms of Autistic Spectrum Disorder was thought to be important, as the associated social skill deficits could potentially impact the interactions to be observed in a manner not associated with being twice exceptional alone. The CARS is a 15 item questionnaire, and involves a brief discussion with the parents and observation of the child by the researcher. The CARS measure is designed to assess the presence and severity of autistic characteristics in children. It has demonstrated good inter-rater reliability and internal consistency when used in exploratory research, and has been used extensively in research for over 30 years. It is considered a practical and established method of determining the presence of autistic

symptomology (Breidbord & Croudace, 2013). Scores can range from 15 (the child's behaviour is rated as normal on all 15 items) to 60 (behaviour is rated as severely abnormal on all items). Scores below 30 are categorised as being outside the clinical range of Autistic Spectrum Disorder (Schopler, Reichler, & Renner, 1988), so only those participants scoring below 30 were included in this project. The twice exceptional participants in this research project displayed scores ranging from 16.5 to 18, so all were considered as being of low risk of having ASD.

Academic records of the twice exceptional students were examined for evidence of academic ability through standardised test results, with the Progressive Achievement Test (PAT) scores of each participating child being gathered for this purpose. The PATs are a series of standardised academic tests developed specifically for New Zealand schools. Most students in New Zealand schools at Years 3-10 are administered the PATs, with the results reported in a standardised stanine form (1-9). The PATs assess academic performance through the use of multiple choice tests in five areas: maths, listening comprehension, punctuation and grammar, reading comprehension and reading vocabulary (New Zealand Council for Educational Research, 2014).

The Coopersmith Inventory (Coopersmith, 1989) was administered to all participating twice exceptional and comparison students as a measure of global self-esteem. The Coopersmith Inventory was developed in 1967 (revised in 1981) as a brief and simple measure of the extent to which children regard themselves as competent, successful, significant and worthy. It measures attitudes towards self in four domains: social self-peers, home-parents, school-academic and general self. The school form of the Coopersmith Inventory consists of 58 items (such as, "I'm easy to like") that are rated as "like me" or

"unlike me", and is administered in under ten minutes (Bolton, 2003). Each item's score is summed to express a value for the four subscales, in addition to a general self-esteem score obtained from summing all measured items. These scores can then be compared to normative populations. The Coopersmith Inventory can be self-rated by students with adequate reading ability, or read to students with a reading disability. It also contains a Lie Scale, with items such as "I never worry about anything", and "I like everybody I know". Higher scores in this subscale is an indication that the student is responding defensively to the items, or that they are responding positively in a deliberate manner.

The construct validity of this measure has been supported through factor analysis of 1397 US students (Roberson & Miller, 1986). The Coopersmith Inventory has also been shown to have good convergent and divergent validity as compared to other popular self-esteem/concept measures (such as the Piers-Harris Children's Self-Concept Scale), and the individual items have been found to show good internal consistency (Johnson, Redfield, Miller, & Simpson, 1983).

Observation measures. Each twice exceptional and contrast student pair were observed by the researcher for a total of four sessions, in order to record their interactions with their teacher and peers during this time. The initial aim was to observe four 60 minute sessions (a total of 240 minutes), but due to varying classroom conditions the total amount of observed time ranged from 184.5 (Students 3A and 3B) to 240 minutes (Students 4A and 4B). Observations were recorded at 15 second intervals, with the interval being marked through with a line and disregarded if no interactions were observed during this period. The students were observed alternatively in each 15 second time period, meaning each student (twice exceptional and contrast) was observed for half of the total observation. A cell phone

interval training application was used in conjunction with headphones to determine when each 15 second interval began and ended.

Teacher and peer interactions were concurrently recorded during a time period that encompassed both formal curriculum time and group activities. It was important to include both these classroom activities so as to maximise the likelihood of recording both teacher and peer interactions. Student-teacher interactions were thought to be more likely occur during formal curriculum time (such as when the teacher gave the entire class instructions), while student-peer interactions during group activities (such as peer reading sessions). The timing of observations was collaboratively discussed with each classroom teacher in advance, to determine what would fit best with their normal classroom practice.

As per Rietveld (1989), each 15 second observation interval was divided into initiation-reaction units to determine the number and type of social interactions in each period. The person initiating the interaction (target student, teacher, or peer) and the response obtained was recorded in each initiation-reaction unit. Each interaction was coded for positive, negative or neutral content. Definitions of each code can be viewed in Table 2 below. Positive interactions include such things as smiling, laughing, thanking and praising, while negative interactions include behaviours such as pushing, glaring, mocking and criticizing. These categories are a simplified version of Rietveld's coding system, as she was examining a far wider range of interactions than is relevant to the current research questions.

Table 2

Observation Categories for Peer and Teacher Interactions (Modified from Rietveld, 1989)

Category	Examples of behaviours
Positive *Verbal and non-verbal*	Greeting, comforting, offering help or materials, apologising, praising, encouraging, thanking, smiling, laughing with someone, sharing, hugging, working cooperatively on the same task, helping, supportive gestures (such as thumbs up, pats or high fives), tickling
Negative *Verbal and non-verbal*	Boasting, accusing, criticising, mocking, insulting, attacking, presenting instructions in forceful or aggressive manner (such as "Sit down now!"), arguing, taking materials without permission, pushing, hitting, laughing at someone, deliberately hurting people, disrupting activity, threatening gestures, frowns, sighs or gestures of disapproval
Neutral *Verbal and non-verbal*	Addressing people for attention, general or specific instructions delivered in neutral tone, any other comments or statements that do not have positive or negative tone or content, accidental contact, swapping or giving materials, actively listening, engagement in activity (such as actively listening)
No response	Ignoring, lack of observed response
Other	Any other interaction not falling into the above categories (notes on nature of interaction were made on observation form)

Procedure

The procedures used in this research project are outlined below, from the initial interview with the twice exceptional students and their parent to the classroom observation process.

Interview. Following confirmation of the twice exceptional student and their parent's interest in participating, an interview was arranged to sign consent forms, collect demographic information, and discuss the student's twice exceptional status with the

student and their parent. These interviews were approximately thirty minutes in duration, and took place at the student's home. The students were given the opportunity to be present during each interview, and two of the four students remained present throughout. The student's parent was asked to complete the Child Autism Rating Scale (CARS) with the researcher at this time to screen for symptoms of ASD.

School informed consent. The participating twice exceptional student's school principal was contacted by email to discuss their school's involvement in the project. If they indicated that they would consider participating, information sheets were sent to the principal and classroom teacher of the twice exceptional student. A meeting was arranged between the researcher and classroom teacher when email consent from the school principal was obtained. The project was discussed and any questions the teacher had were answered at this point. The teacher and principal were then requested to sign their consent forms. Suitable times for classroom observations were collaboratively determined with the classroom teacher, and they also provided the researcher with access to the twice exceptional student's latest Progressive Achievement Tests (PATs) results. An information and consent form was then sent and sought from the selected contrast student and their parent/s.

Classroom observation process. On entering each classroom, the researcher chose an unobtrusive place at the back of the class where visibility to the students was unobstructed. The students undertook their regular classroom activities for the one hour period of observation, while the researcher continuously recorded the twice exceptional, comparison students' and teachers' behaviours alternatively on the interval recording form. Recording was suspended if either student left the room for any reason, resuming on their

return. On conclusion of the one hour recording period, the researcher left the classroom as unobtrusively as possible so as to minimise disruption to the classroom routine.

On finishing the last observation session the twice exceptional and comparison student were administered the Coopersmith Inventory in a quiet area of the classroom or separate area. The participants were given the option of reading and completing the items themselves or having the researcher read aloud the items to them, with Participants 1A and 1B choosing to have the items read to them. The participating students and their teachers were thanked on conclusion of the observations, and a small koha was given to them as a gesture of appreciation for their time.

As the observation time was determined collaboratively with the classroom teacher, the observed activities varied between each school. An outline of the classroom activities that took place in each school's observation period is discussed below.

School one. The participants were observed on successive Tuesday mornings (except where illness of the participants, school holidays or school activities intervened) between 9:30am and 10:30am. During this time the class was engaged in rotating group literacy activities, with an emphasis on self-management. Both participants (1A and 1B) were in the same group, undertaking a variety of activities (such as self-directed writing and reading games) before shared reading sessions with the teacher. The total observation time of each session varied between 49 minutes and 57 minutes, with one session terminated at 31.5 minutes due to researcher technical issues.

School two*.* The observations took place on successive Monday mornings between 11am and 12pm - this period encompassed the class's normal reading and writing instruction. The class undertook self-directed reading and writing while the teacher took

each reading group in turn for group discussion of a shared text. Not every reading group was addressed at each session, so subsequently participants 2A and 2B had different proportions of self-directed and group activities on some days (each boy was in a different reading group of slightly differing ability). A reading comprehension test was administered during the observation period in one session. The whole class generally came together for the last part of the session, listening to the teacher read a book and answering related questions. All four observation sessions were 60 minutes in length.

School three. The participants were observed on successive Tuesday and Thursday mornings between 9:15am and 10:15am. The students were engaged in maths-based activities during this time, alternating between small group independent study and teacher-led instruction. Participants 3A, 4A and 4B were in one maths group while 3B was in another, but the independent study/teacher instruction ratio was approximately the same for all participants. The observation sessions for participants 3A and 3B varied in length from 56.75 minutes to 60 minutes, with one session terminated at 8.5 minutes due to classroom activities preventing further observation through separation of participants in different rooms. All four observations sessions for participants 4A and 4B were 60 minutes in length.

Data analysis

The demographic and background information obtained during the initial interviews with the twice exceptional students and their parents was summarised and recorded. A copy of the interval recording sheets used to collect the observational data can be viewed in Appendix E. From the recording sheets, each interaction unit recorded was transferred to an Excel spreadsheet, and then collated in table form for further examination. The total

number of interaction units was counted for each student over the observed period, with frequency counts of the defined interaction types (positive, negative, neutral and no response) being completed at this time also. These amounts were converted to a percentage of the total recorded interactions due to the varying time intervals of each observation session. The Coopersmith Inventory results were added together and scored out of 50 for each participating student, and their subscores and total score was recorded.

CHAPTER THREE

RESULTS

The results of this study are presented in table form. The total number of interactions, the type of interactions, and the total peer and teacher interactions of the twice exceptional and comparison students are displayed in Table 3. The totals are expressed as percentages due to the varying number of intervals recorded over the four observation sessions. The observation intervals ranged from 738 intervals (184.5 minutes) to 960 intervals (240 minutes) of 15 seconds each.

The percentage displayed for total interactions is the proportion of time each student spent interacting with their peers or teacher over the total period they were observed. The period of observation for the individual students was half of the total observation time for each pair, as each student in the pair was observed in alternative 15 second intervals over the entire session. The type of interactions recorded encompass both initiation and response types (positive, negative, neutral or no response), as each interaction involved both an initiation and a response type. This means that each individual interaction between the twice exceptional students and their peers or teacher had the ability for both an initiation type and a response type to be recorded. The percentages displayed for interaction types express this as a proportion of both sides of each interaction (initiation and response), i.e. the percentage is worked out from double each student's total recorded interactions.

Table 3

Total Number and Percentages of Twice Exceptional (A) and Comparison (B) Students Recorded Interactions

		Total No. and %	**Students**							
			1A	**1B**	**2A**	**2B**	**3A**	**3B**	**4A**	**4B**
Total no. of intervals recorded			762		958		738		960	
No. of intervals for each student			381	381	479	479	369	369	480	480
Total interactions		No.	242	274	190	146	160	163	202	240
		%	63.5	71.9	39.7	30.5	43.4	44.2	42.1	50.0
Type of interactions	*Positive*	No.	133	138	151	70	119	104	135	254
		%	27.5	25.2	39.7	24.0	37.2	31.9	33.4	52.9
	Negative	No.	43	28	2	5	11	4	8	32
		%	8.9	5.1	0.5	1.7	3.4	1.2	2.0	6.7
	Neutral	No.	257	344	192	176	182	203	237	174
		%	53.1	62.8	50.5	60.3	56.9	62.3	58.7	36.3
	No Response	No.	52	38	35	41	8	15	24	20
		%	10.7	6.9	9.2	14.0	2.5	4.6	5.9	4.2
Peer interactions	*Total*	No.	168	204	114	59	66	97	159	204
		%	69.4	74.5	60.0	40.4	41.3	59.5	78.7	85.0
	Peer Initiated	No.	51	111	48	27	30	54	80	101
		%	21.1	40.5	25.3	18.5	18.8	33.1	39.6	42.1
	Student Initiated	No.	117	93	66	32	36	43	79	103
		%	48.3	33.9	34.7	21.9	22.5	26.4	39.1	42.9
Teacher interactions	*Total*	No.	74	70	76	87	94	66	43	36
		%	30.6	25.6	40.0	59.6	58.8	40.5	21.3	15.0
	Teacher Initiated	No.	40	41	68	71	91	64	41	36
		%	16.5	15.0	35.8	48.6	56.9	39.3	20.3	15.0
	Student Initiated	No.	34	29	8	16	3	2	2	0
		%	14.0	10.6	4.2	11.0	1.9	1.2	1.0	0

Student-peer and student-teacher interactions were grouped together when examining the overall results, due to the large majority of student-teacher interactions being neutral in type. As most of these interactions revolved around on-task activities, separating these out from the peer interactions was thought to have little impact on the results obtained.

Students 1A and 1B

Students 1A and 1B were observed for 762 intervals, making a total observation period of 190.5 minutes across all four sessions. Student 1A had 242 interactions recorded during this period (interacting for 63.5% of the recorded time), while Student 1B had 274 interactions over this period (71.9% of the recorded time). The difference in total interactions recorded between Student's 1A and 1B was 32 over the entire observations, meaning Student 1B interacted 8.4% more during this period than Student 1A. Both students displayed a similar percentage of positive interactions, Student 1A with 133 (27.5%) and Student 1B with 138 (25.2%) interactions, but differed on the other types of interactions recorded. Student 1A displayed more interactions involving a negative initiation or response, 43 interactions (8.9%) as compared to Student 1B's 28 (5.1%). He was also shown to either have or receive no response during peer or teacher interactions more than Student 1B, 52 (10.7%) and 38 (6.9%) respectively. Student 1A spent proportionally less time in neutral interactions than Student 1B (257 interactions; 53.1% as compared to 344 interactions; 62.8%).

Student 1A was shown to interact with his peers only slightly less than Student 1B with 69.4% compared to 74.5% respectively, but he was not as involved in peer initiated

interactions as he only engaged in these interactions 21.1% of his time compared to Student 1B with 40.5%. This finding suggests that Student 1A initiated peer interactions at a much higher frequency than Student 1B, although Student 1B engaged in a similar total number of peer interactions over the observed period (168 as compared to 204). Student 1A showed a similar level of teacher interactions to Student 1B, with 74 and 70 interactions respectively, and both students had similar levels of teacher initiated interactions with 16.5% and 15.0% respectively.

Students 2A and 2B

Students 2A and 2B were observed for 958 intervals, with a total observation period over the four sessions of 239.5 minutes. Student 2A interacted for 39.7% of this time (190 intervals) as compared to Student 2B's 30.5% (146 intervals). This means that Student 2A showed 9.2% more peer and teacher interactions during the observed sessions, a difference of 44 interactions over the entire period. The type of interactions displayed differed slightly across Students 2A and 2B, except for negative interactions which were similar for both boys (Student 2A with 0.5% and Student 2B with 1.7%). Student 2A showed proportionately more positive interactions than Student 2B, at 39.7% (151 interactions) and 24.0% (70 interactions) respectively. He also displayed a lower percentage of neutral interactions, at 50.5%, or 192 interactions, than Student 2B with 60.3%, or 176 interactions. Student 2A was less likely to give a response or receive no response in his interactions than Student 2B, at 9.2% (35 interactions) and 14.0% (41 interactions) of the total interactions recorded.

Student 2A interacted with his peers at a higher rate than Student 2B (60% and 40.4% of the total interactions recorded respectively), with largely similar levels of peer

initiated interactions (Student 2A with 25.3% and Student 2B with 18.5%). The proportions of peer and student initiated interactions between Students 2A and 2B were therefore similar, but Student 2A engaged 55 times more in these interactions over the observed period. Student 2A spent less time interacting with his teacher than Student 2B, with 40.0% and 59.6% respectively, and was 12.8% less likely to initiate these interactions. Although the total number of teacher initiated interactions were similar across both students (Student 2A had 68 interactions and Student 2B had 71), Student 2A spent proportionality less time, 35.8%, than Student 2B, 48.6%, in these teacher interactions.

Students 3A and 3B

The total observation period for students 3A and 3B was 184.5 minutes, or 738 fifteen second intervals. These students had a very similar number of recorded interactions during this period, with Student 3A having 160 and Student 3B having 163 interactions. As such, each student spent a proportionately similar time interacting with their peers or teacher (43.4% and 44.2% respectively). The types of interactions shown by Students 3A and 3B were also fairly similar, with the greatest difference between the four types recorded evident in positive and neutral interactions. Student 3A had 119 positive interactions (37.2% of his time), while Student 3B had 104 positive interactions (31.9% of his time). In terms of neutral interactions, Student 3A showed slightly less interactions of this type than Student 3B, with 182 (56.9% of his time) and 203 (62.3% of his time) interactions recorded respectively. Both negative and no response interactions had a difference of less than 2.1% between both students.

Student 3A was shown to have a lower number of peer interactions (41.3% of his interactions) than Student 3B (59.5% of his interactions). This means Student 3A had 33 less peer interactions over the observed period than student 3B. Of these interactions, Student 3A was less likely to be involved in peer initiated exchanges (18.8% of his time) than Student 3B (33.1% of his time). This indicates that Student 3A showed a greater frequency of self-initiated interactions during the observation period. Student 3A also showed a greater number of teacher interactions than Student 3B (94 interactions as contrasted to 66) with Student 3A showing 58.8% of his total classroom interaction time with his teacher, compared to 40.5% as seen in Student 3B. Student 3A was more likely to initiate these interactions than Student 3B (56.9% and 39.3% of the total teacher interactions respectively) meaning that he exhibited more teacher interactions, and initiated these more often than Student 3B.

Students 4A and 4B

Students 4A and 4B were observed for 240 minutes, which was 960 intervals across all four sessions. Student 4A was seen to interact during 42.1% of this period (202 interactions), while Student 4B interacted for 50.0% of this time (240 intervals). This means that Student 4A interacted with his peers or teacher for 7.9% less time than Student 4B. There was a notable difference in the way they interacted within the classroom also. Student 4A showed less positive and negative interactions than Student 4B. Student 4A had 135 positive interactions (33.4% of his time), while Student 4B had 254 positive interactions (52.9% of his time) over the same period. Student 4A showed less negative interactions than Student 4B, with 8 (2.0% of his time) and 32 (6.7%) recorded interactions respectively.

He also demonstrated more neutral interactions than Student 4B, with 237 (58.7%) and 174 (36.3%) interactions recorded respectively. The number of interactions involving no response was similar between both students, with Student 4A showing 24 of these interactions (5.9%) and Student 4B 20 interactions (4.2%).

In terms of peer interactions, student 4A demonstrated less time spent overall in peer interactions than Student 4B (78.7% as compared to 85.0%), but the number of peer initiated interactions were similar (39.6% and 42.1% respectively). This indicates that Students 4A and 4B had similar proportions of peer and self-initiated interactions, but Student 4A had a lower frequency of peer interactions. Both students interacted with their teacher at a similar frequency (21.3% and 15.0% of their total interactions respectively), and the number of teacher initiated interactions were also similar (20.3% and 15.0% of the total interactions with their teacher).

Coopersmith Inventory Scores

The twice exceptional and comparison student's Coopersmith Inventory scores, the self-esteem measure used in this research project, are presented in Table 4. Each student's subscale scores, comprised of general self, social self-peers, home-parents, school-academic and home-parents, are displayed below.

The twice exceptional and comparison students reported differences in their subscale responses on the Coopersmith Inventory. The General Self subscale has a maximum raw score of 26, while each of the remaining subscales (Social Self-Peers, Home-Parents and School-Academic) has a maximum possible score of 8. Each twice exceptional

student reported a lower score on the General Self subscale than their matched comparison students, with the average twice exceptional student score being 15.5 and comparison students 21.75. On the Social Self-Peers subscale, Students 1A, 2A and 4A each rated themselves as slightly lower than the comparison students. Their scores ranged from 4-6, as compared to their comparison students 6-7. Student 3A was the exception to this trend, as he rated himself 1 point higher than student 3B (8 and 7 respectively) on this scale. Most students rated themselves between 6-8 on the Home-Parents scale, with the exceptions of Students 1B and 4B who both rated themselves as 4. The School-Academic subscale showed a difference between how the twice exceptional and comparison students answered the items. The twice exceptional students' scores ranged from 3-6 (average of 4.75) on this subscale, while the comparison students' scores ranged from 5-8 (average of 6.5).

Table 4

Coopersmith Inventory Subscale Scores for Twice Exceptional (A) and Comparison (B) Students

	Students							
Subscale	**1A**	**1B**	**2A**	**2B**	**3A**	**3B**	**4A**	**4B**
General self	12	22	15	21	17	21	18	23
Social self-Peers	4	6	6	7	8	7	5	6
Home-Parents	7	4	6	7	8	7	8	4
School-Academic	3	7	5	8	6	6	5	6
Lie scale	0	3	1	3	4	3	1	0

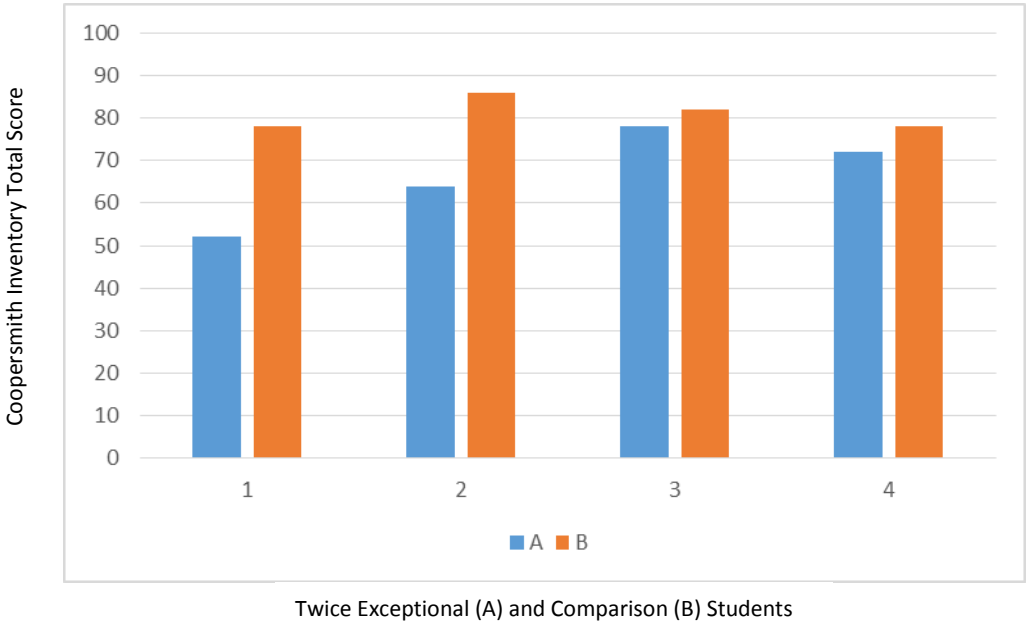
Note. A higher score indicates higher levels of self-esteem, except on the Lie Scale where this indicates higher levels of defensiveness in a student's responses

The Coopersmith Inventory total scores of all students are presented in Figure 1 below. The means for this score lie between 70-80, with a standard deviation of 11-13

(Coopersmith, 1989). As can be seen in Figure 1 - each twice exceptional student (Students 1A, 2A, 3A and 4A) all recorded a lower total score than their paired comparison student. All of the comparison students (1B, 2B, 3B and 4B) had scores suggesting their self-esteem laid within the average to high range, ranging from Students 1B and 4B with 78, to Student 2B with 86. Two of the twice exceptional students, Students 3A and 4A, were both within the average range with a score of 78 and 72 respectively. The remaining two twice exceptional students scored lower than average, with Student 1A scoring 52 and Student 2A scoring 64. The average Total Score on the Coopersmith Inventory across the twice exceptional students was 66.5, while the average total for the comparison students was 81. Student 3A had the highest score on the Lie Scale at 4, which was not considered high enough to question the authenticity of his answers.

Figure 1

Coopersmith Inventory Total Scores of Twice Exceptional (A) and Comparison (B) Students



CHAPTER FOUR

DISCUSSION

This research project aimed to determine whether twice exceptional primary school students differed from their typically developing peers in the frequency and/or type of classroom interactions. These interactions between twice exceptional students, their peers and teachers may have an impact on developing self-esteem. Therefore, a self-esteem measure was administered to the four twice exceptional and four contrast students to assess how the twice exceptional students rated themselves in comparison to their peers. As there is very little existing research in the area of twice exceptional students 'classroom interactions or their self-esteem levels, this exploratory study examined only four twice exceptional students and their matched peer controls. The research questions this study aimed to address are discussed as follows. Firstly, the number and type of classroom interactions that twice exceptional primary school students had was compared to their typically developing peers. Next, the interactions of the four twice exceptional students with their peers and teachers were examined in relation to their paired comparison students. Finally the self-esteem of the twice exceptional students, as measured by the Coopersmith Inventory (Coopersmith, 1989), is discussed in relation to that of their comparison students. Each of the students in the study were males aged either nine or ten years old. The results demonstrated that the way these four twice exceptional students interacted with their peers and teachers differed in some ways from their matched controls, but not in all ways.

Classroom interactions. The first research question asked whether there was any difference in the number or type of classroom interactions between the four twice

exceptional students and their comparison students. Overall, the twice exceptional students showed a similar number of interactions with their peers or teacher than their matched comparison students. Students 1A and 4A spent slightly less time interacting with their peers or teacher than Students 1B and 4B over the observed period, while Student 3A interacted at the same frequency as student 3B. Student 2A however, showed the opposite of this trend, as he was observed 9% more time in interactions with his peers and teacher than his comparison Student 2B. This finding suggests that the amount of time that the twice exceptional students spent engaged in classroom interactions was not substantially different from the typically developing comparison students. These results seem novel, as there appears to be no research currently identified that examines the interactions of twice exceptional students within the classroom environment. Certain characteristics common to gifted students with learning difficulties have been identified in the literature, such as short attention spans, high distractibility, problems reading social context and emotional volatility (Reis, Baum, & Burke, 2014), but these behaviours did not appear to influence the number and type of interactions observed in this current study.

In the present study, the types of interactions that twice exceptional students displayed within the classroom were also found to be similar to the comparison students. On average, the twice exceptional students showed a very similar number of interactions as the comparison students. These students appeared to interact within the classroom in a similar manner to their peers, with all seemingly using successful social strategies such as cooperation and humour during anecdotal observations. The twice exceptional students observed were able to engage their peers and teacher in shared discussion on both an academic and social level, such as when student 4A told jokes to his peers and made them laugh. These students seemed well liked by both their peers and teachers, and appeared to

interact freely within the classroom environment. The twice exceptional students appeared to have positive relationships with their teachers, as evidenced by their answers on the Coopersmith Inventory School-Academic subscale and also by the warm and caring way in which their teachers spoke about their students.

Three of the students (1A, 2A and 3A) were observed engaging in more positive interactions than their comparison students. The only exception was Student 4A, who had less positive interactions than his comparison student. With the exception of this student, it could be that there is a tentative suggestion that twice exceptional students' classroom interactions may be slightly different in terms of positive and neutral interaction types. This finding is in contrast to the small amount of research available concerning twice exceptional students classroom interactions, which suggests that they are less socially competent that their typical peers (McEachern & Bornot, 2001). It appears from the high level of positive interactions recorded that the students in this study were utilising successful social strategies, such as using humour to engage peers or cooperation in shared tasks. This suggests that their social competence is more akin to the gifted population rather than those with learning difficulties, as the latter group have a high incidence of social skill deficits and negative classroom relationships (Kavale & Forness, 1996).

Student-Peer interactions. The second research question addressed the number and initiator of student-peer interactions of twice exceptional primary school students compared to their typically developing peers. Three of the four twice exceptional students (Students 1A, 3A and 4A) were shown to have a lower number of peer interactions during the recorded intervals than their matched comparison students. A lower rate of peer interactions could possibly be attributed to the compromised social skills of students with

learning difficulties, with deficits in both initiating and responding social behaviours commonly seen in this group (Vaugh, Zaragoza, Hogan, & Walker, 1993). Students with learning difficulties tend to have problems with both engaging their peers in social interactions, and maintaining social communication successfully. The exception to this trend was Student 2A, who had 55 (19%) more peer interactions than his matched comparison Student 2B. It seems unlikely that social deficits caused by learning difficulties are the sole explanation for the lower number of peer interactions when the previous finding of high levels of positive interactions is taken into account. It could be that the presence of a learning difficulty may partially inhibit these twice exceptional students' ability to initiate and maintain frequent interactions with their peers, but that their giftedness allows them to purposely use positive social strategies when the interactions do occur. This could be seen in the frequent use of humour and readiness to share resources and skills amongst the twice exceptional students in their peer interactions. The phenomenon of more conscious use of social strategies in gifted students has been reported in the literature, with this population reportedly utilising successful social strategies such as humour and sensitivity to peer needs in a deliberate manner (Barber & Mueller, 2011).

In terms of who initiated the peer interactions, the twice exceptional students showed a slight trend towards a lower number of peer initiated interactions than their comparison students. This result indicates that two of the twice exceptional students, Students 1A and 2A, initiated more peer interactions than their matched typically developing classmates. A possible explanation for these twice exceptional students initiating more peer interactions than their peers, may involve them placing more effort into using a number of different social strategies. This could be seen in Student 1A, who followed his peer around attempting to engage him in discussion on various topics until he found a topic

his peer was interested in. Student 3A also demonstrated useful social strategies. For example, when he was seen to provide assistance to his peers when involved in group work. He was using his academic abilities to help his peers when they were engaged in a class activity, cooperating with the small group to complete the task. As suggested by Bain and Bell (2004), the use of deliberate social strategies is something that gifted students have a tendency to do.

Students with learning difficulties usually demonstrate a particular difficulty with initiating peer interactions, a social skill deficit that probably remains stable over time. This is shown in the fact that younger students with learning difficulties (those aged 6-8 years) initiate fewer nonverbal interactions with their peers (Agaliotis & Kalyva, 2008), in addition to generally low levels of social competence in comparison to their typical peers (Kavale & Forness, 1996). The twice exceptional students in this study appeared to be utilising social strategies more similar to that used by gifted children than those with learning difficulties, in that they had little trouble initiating successful interactions with their peers. All of the twice exceptional students observed looked comfortable engaging their peers in social interactions, such as when Student 4A leaned over the shared table during an independent activity to whisper jokes to three peers.

Student-Teacher interactions. The third research question asked how the number and initiator of student-teacher interactions of twice exceptional primary school students compare to their typically developing peers. There was no discernible difference between the number of student-teacher interactions of the twice exceptional and comparison students, with all four twice exceptional students appearing to interact with their teachers in a manner similar to their peers. This could be seen in the way they initiated interactions,

such as using the teacher's name to attract her attention, waiting in line with their peers to get work marked, or raising their hand to answer a question when in a group. This finding is in contrast to what Maltby (1983) reported, where she suggested that gifted students spend proportionately more time interacting with their teacher than their typical peers. As this was the only study found to quantify this area however, it could be that there are other unknown factors influencing gifted students teacher interactions also.

The primary initiator of student-teacher interactions varied between the eight students. Students 2A and 3A demonstrated polar trends (Student 2A with less teacher-initiated interactions than his comparison student and Student 3A with more), a finding that could be accounted for by the differing classroom management styles between their teachers. Student 2A's teacher directed many encouraging comments at Student 2A as he was quietly undertaking independent work. His comparison student, Student 2B, was off-task more often than Student 2A, thus did not receive as many positively reinforcing teacher interactions for appropriate behaviour. Student 3A was more reserved in his social interactions in contrast, preferring to talk quietly to his peers and only interacting with his teacher when needing assistance with his academic work. His teacher was more likely to leave the students alone in their work until they initiated interactions themselves, something Student 3B was more likely to do than student 3A.

Of the student-initiated interactions, there was a slight trend towards the twice exceptional students initiating more interactions with their teachers than their comparison students. Students 1A, 3A and 4A all showed higher levels of self-initiated interactions with their teachers than their peers, although the levels in Students 3A and 4A were very low. This is a finding supported by the limited literature on student-teacher interactions amongst

gifted students, which suggests that these students initiate contact with their teachers on a frequent basis (Netz, 2014). Student 2A however, displayed the reverse of this trend as he was recorded initiating interactions with his teacher 6.8% less often than his paired comparison student. The impact of the individual classroom dynamics may have played a role in this finding. The low level of student-initiated teacher interactions at School 3 (Students 3A/B and 4A/B) could be a function of the classroom activities observed. These students were engaged in a mixture of teacher-led and independent maths activities, with little need for the students to seek out and engage the teacher in interaction. Students 1A and 2A at Schools 1 and 2 were engaged in more self-directed learning activities during the observation sessions, so possibly sought out their teacher more often to clarify what they were doing as a result of this. It still remains however that three of the twice exceptional student were more likely to initiate interactions with their teacher than their comparison students, a finding in line with the limited literature available on gifted students teacher interactions.

Self-Esteem. The final research question examined how twice exceptional students and their comparison peers rated their self-esteem. Overall, the findings showed the twice exceptional students rated themselves lower than their comparison students on all areas of the Coopersmith Inventory except the Home-Parent subscale. This finding suggests that the twice exceptional students in this study have lower levels of self-esteem than their peers, perhaps as a result of the mismatch between their intellectual abilities and their academic performance. This finding is consistent with what Barber and Mueller (2011) reported; that twice exceptional students tend to report lower self-esteem levels than their typical peers. Academic self-esteem was lower in the four twice exceptional students studied. This could indicate that these students are beginning to internalise feelings of frustration with the

discrepancy between their intellectual potential and academic abilities, something that should be addressed early to prevent the development of maladaptive emotional problems (Nielsen, 2002). This fits with the increasing levels of anger and inadequacy that the parents of the twice exceptional students reported seeing on interviewing them, with two of the students displaying self-injurious behaviour on occasion in response to academic frustration. It is interesting to note that while Students 3A and 4A reported lower self-esteem scores than their matched comparison students, their Total self-esteem score was still within the normal range. This could be a function of them being twins. As the development of self-esteem is highly dependent on the social context of the child (RJ Shavelson, JJ Hubner, & GC Stanton, 1976), having a twin sibling that displays a similar pattern of twice exceptionality could lead to more acceptance of self. It is also positive that each of the twice exceptional students reported reasonable levels of satisfaction with their home environment on the Home-Parents subscale of the Coopersmith Inventory. This is an important protective factor in their developing self-esteem (Barber & Mueller, 2011).

The fact that all the twice exceptional students attended a programme for gifted students could also have had an impact on their measured self-esteem levels. If self-esteem can be considered a process of evaluation through comparing yourself to others (Hosogi et al., 2012a), the twice exceptional students experience of being in a gifted programme with peers of similar abilities may have influenced this comparison process. Peer acceptance is considered as especially important for the developing self-esteem of twice exceptional students (Barber & Mueller, 2011), so being in a social context with others who understand the quirks associated with giftedness could have a positive influence on this in these students case.

Limitations

There were a number of limitations encountered in the course of this research project, covering both logistical and theoretical challenges. The first of these was the differing number of observed intervals between the four student pairs. In the initial methodology, it was planned to observe each pair of students for four one hour sessions (each resulting in a total of 240 recorded intervals – 120 each for the twice exceptional and comparison student). This should have provided a total of 960 recorded intervals for each student pair over the entire observation period, which was the case for Students 4A and 4B. Students 2A and 2B approximated this number of observed intervals also, only missing two (958 intervals) over the observation period due to a recording error of the researcher. Student pair's 1A/B and 3A/B ended up with substantially less than 960 recorded intervals. Students 1A and 1B had three observation sessions ranging from 49-57 minutes in length, and one at 31.5 minutes. This resulted in a total observation period of 762 recorded intervals only. This variation in observation length was mainly due to logistical issues around the timing between arriving for observations and morning interval, with the shortest observation time being a result of equipment failure of the researcher. Students 3A and 3B had three observation sessions ranging from 56.75-60 minutes, and one at 8.75 minutes (making a total of 738 recorded intervals). The short session was due to several classes merging for the day, with the twice exceptional and comparison student separating into different classrooms. As the observation periods differed across the students, all the frequencies and types of interactions examined were worked out as a proportion of each student pair's recorded intervals. There is no question that having the same observation lengths across all the student participants would have made comparison between them simpler, but the reality of observing in a dynamic and changing classroom environment did

not make this an option. The research design specified that this was a descriptive study (with no manipulated variables), partly due to the complexity of examining social phenomena in an applied setting (Dulock, 1993). This complexity was clearly evident in a classroom environment. There were some instances where more homogeneity of observation lengths could have been achieved (such as in moving students 3A and 3B back into the same classroom), but this would have gone against the descriptive nature of observing the social interaction whilst having minimal impact in the environment. The differing observation lengths may therefore been seen as an inconvenience, but this was necessary due to the nature of the research being undertaken.

Another factor which may have confounded the results was the differing nature of the three classroom lessons. Lessons at Schools 2 and 3 were an equal balance between teacher-led and independent activities, with students taking instruction from the teacher before undertaking independent or group work on the assigned topic. School 1 followed a different learning model. The students moved in small groups between multiple different learning activities, including teacher-led reading instruction. There was much more opportunity for social interactions to occur in the observed period at School 1, as evidenced by Student 1A's total time spent in interactions (63.5%) as compared with Student 3A with 43.4% of his time spent in interactions. The type of lesson could have had an influence on the type and frequency of interactions recorded. There was also a difference between the types of activities observed in each classroom. Schools 1 and 2 were observed during educational literacy activities (including teacher-led reading and independent writing practice), while School 3 were involved in maths based activities while under observation. This could have had a possible impact on the results as the four twice exceptional students had varying learning difficulties involving literacy, whereas Students 3A and 4A stated that

maths was one of their favourite subjects. In future research it is recommended to limit observations to just one subject area, such as literacy or maths based activities.

Recruiting twice exceptional students for research was difficult. This could be due to both New Zealand's small population base, and also current educational policy around the identification of gifted students. For example, in a school of 600 students it would be expected around 1/6 of the top 5% academic achievers could be potentially considered twice exceptional (Silverman, 1989). This equates to five students in the maximum school roll of 600, a small proportion of the total students within the school. Consider also that many twice exceptional students are not identified as such due to their performance typically lying within the average range expected for their age group (Nielsen & Higgins, 2005), the problem in seeking out these students to participate in research becomes compounded. As New Zealand has no standardised national policy for the identification of gifted students (NZ Ministry of Education, 2012), it largely becomes the parents responsibility to seek out private cognitive assessment if giftedness is suspected and formal testing is desired. Learning difficulties also have no standardised definition globally, and are usually only identified after multiple interventions fail to have a significant impact on the student's learning progress (Lovett & Sparks, 2013). This combination of factors means the population base of identified twice exceptional primary school students within New Zealand is limited to parental (or teacher) knowledge and expertise on what constitutes giftedness, in addition to access to adequate financial resources in order to obtain cognitive assessment if necessary. The participants in this study meet this profile in terms of having affluent family backgrounds with educated and involved parents.

As has been discussed above, the validity of categorising 'twice exceptional' students has been questioned in the research due to the lack of common criteria in both the

identification of giftedness and learning difficulties (Lovett & Sparks, 2013). This poses problems when examining twice exceptional students as a population, as the wide variety of cognitive and academic achievements displayed by this group mean it would be difficult to develop an identification 'profile' or guidelines to what twice exceptional actually looks like in practice (Foley Nicpon et al., 2011). Instead of attempting to develop an identification profile, it seems apparent that the identification of twice exceptional students is reliant on intra-individual achievement rather than comparison to others (Foley Nicpon et al., 2011). Even though the academic skill deficits were different throughout the twice exceptional students in this research project (ranging from reading difficulties, problems with written expression to slow processing speed), the themes of personal frustration at the disparity between their intellectual ability and their academic performance was evident in them all on interviewing their parents. Several students had displayed evidence of severe frustration (including physical aggression towards themselves or calling themselves derogatory names), and all the parents expressed concern that this was having an increasing impact on their developing self-esteem. This common emotional response to the experience of being twice exceptional may prove to be more useful in developing methods of identifying twice exceptional students than a focus on cognitive profile disparities or academic achievement alone.

Implications

There are several implications for supporting twice exceptional students' development of social interactions and positive self-esteem levels that could be drawn from this small research project. All of the twice exceptional students in this study were considered socially adept by their peers and teachers. It is heartening to see that the social

deficits associated with learning difficulties, and to a different or lesser degree giftedness, seemed not to be evident in these students. This could be partially attributed to the supportive environment that both their teacher and parents had created around them, such as through parents encouraging friendships with like-minded students and teachers modelling positive classroom interactions for example. Providing an environment that promotes positive social relationships could be an important factor in increasing the development of twice exceptional students' social confidence and skills.

Effective teaching practices could be a factor supporting the self-esteem of twice exceptional students. Each teacher was observed by the researcher to be effective at engaging their students in various learning activities at an appropriate level for them. Most of the twice exceptional students rated their self-esteem lower on the School-Academic subscale of the Coopersmith Inventory than their comparison student, indicating that they did not feel confident in their academic abilities at school. It is interesting then that each student chose "unlike me" for the item relating to teacher interactions ("My teachers make me feel I'm not good enough"). In combination with the student-teacher interactions seen by the researcher, this suggests that the teachers in this study are engaging their twice exceptional students at an appropriate academic level without them feeling confused or unclear about their learning tasks. Supportive teaching practices may minimise the frustration associated with the cognitive disparities demonstrated by twice exceptional students, by allowing them to gain academic support where required without feeling inadequate. A positive student-teacher relationship has a powerful impact on academic, social and emotional development (Luckner & Pienta, 2011), which may be of even more importance when looking at the school experience of twice exceptional students.

Future Research Directions

When conducting research of this type in future, there are a number of factors that could be considered to improve the quality of the gathered results. Firstly, it would be advisable to ensure that the observed intervals are of equal length for each pair of student participants. This was the intention in this research project, but the realities of classroom interruptions and activities meant it was unable to be achieved. If this proved difficult in the future for similar reasons, it may be that reducing the observed recordings to the lowest common time recorded across all participants could be an idea to obtain more uniform results for comparison. Secondly, as mentioned above, it would provide more comparable results if all the students were observed during similar activities (such as reading or writing activities). Thirdly, future research could be directed at examining the impact of differing teaching styles on the interactions of twice exceptional students. The three teachers in this research project all demonstrated warm and engaged relationships with their students, and were talented at managing the classroom dynamic in favour of a positive learning environment. This may have influenced the frequency and type of interactions the twice exceptional students had within the classroom. Examinations of a wider range of teaching practices and resulting classroom environments may uncover differences in the way the students interact. Finally, the initial interview with the twice exceptional student's parent proved an excellent source of information on how the student had coped with school over time and their social functioning. If undertaking this research again, more formal psychometric measures could be useful in addition to a more structured interview to gather more information regarding strengths and challenges that twice exceptional students experience both academically and generally in their lives.

Conclusion

This research project sought to address the lack of research in the area of twice exceptional students' classroom interactions and the impact on their developing self-esteem. This was achieved through observing four twice exceptional primary school students and their comparison students within their classrooms, recording and categorising their interactions with their peers and teacher.

It was found that the number and type of interactions that the four twice exceptional students exhibited with their peers and teacher were similar to those shown by their matched typically developing comparison students. The twice exceptional students had at least the same level of positive interactions with their peers and teachers as their comparison students, with only slight differences noted in the number of peer/teacher versus student initiated interactions. This indicates that the twice exceptional students in this research displayed similar social interactions to their peers within the classroom, which is further supported by their parents' comments on their well-developed social skills. It is possible that their giftedness is mitigating the social skill deficits normally associated with learning difficulties (Kavale & Forness, 1996), through the more purposeful use of successful social strategies (Barber & Mueller, 2011).

The four twice exceptional students examined all reported lower overall self-esteem scores on the Coopersmith Inventory than their comparison students, with two students being considered to have self-esteem lower than what would be expected from the general population. These results were especially evident in the General and Home-Academic subscales, indicating that these areas demonstrate the greatest disparity between the twice exceptional and typically developing students observed. It is unclear whether these lower

self-esteem scores will remain static, or whether the increasing frustrations of high intellectual ability and learning difficulties could widen this gap over time.

Overall, the twice exceptional students in this research project engaged in social interactions within the classroom that were comparable to those of their matched typically developing students. They utilised social strategies in a way that promoted successful social relationships with both their peers and teacher, something that is more akin to how gifted students interact rather than those with learning disabilities (Bain & Bell, 2004; Kavale & Forness, 1996). This suggests that the social deficits associated with learning difficulties are mitigated by the skills that gifted students possess, although the lower self-esteem scores of the twice exceptional students could mean that this is achieved at some personal cost. This research, while exploratory and limited in scope, points to the importance of supporting twice exceptional students in their development of positive self-esteem, while being encouraging about the number and type of social interactions that these students experience within the classroom.

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Appendix A

Invitation to Participate in the Research for Distribution to Parental Members of Gifted Associations

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An invitation to participate in a research study investigating the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

Twice exceptional students are those that have been identified as being gifted, but also have a disability of some form. In my research I am considering those students that are gifted with a learning or behavioural difficulty. There is very little research in this area, and I am hoping to expand this through my own study.

I am conducting research in this area as part of my Masters in Child and Family Psychology, and am currently recruiting students to participate in my study. This would involve a brief initial interview with you and your child, then me observing them in their classroom over 2-3 weeks. The student will complete a brief self-esteem questionnaire on completion of the observations. I do not anticipate any changes to their classroom routine, and will maintain a minimal presence within the classroom during the twelve 30 minute observations.

For students to participate, they will:

- Be identified as intellectually gifted by their school or through formal testing
- Be identified as having learning or behavioural difficulties through their school or formal testing
- Be aged 5-12 years and attending a Christchurch school
- Speak English as their first language
- Not have a diagnosis on the autistic spectrum

If you and your child would like to know more about my small project or would consider participating, please contact me on the details below. I realise that your time is valuable, and I appreciate your consideration of participation.

Thank you,

Taryn Lewis Phone: 021 126 6027

Email: taryn.lewis@pg.canterbury.ac.nz

Appendix B

Information and Consent Forms

An investigation into the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

Information sheet for Children

(for Taryn or parents/caregivers to read with the child – as applicable)

My name is Taryn, and I am doing a project at the University. I will work with your Mum or Dad (as applicable), teacher and other children in your class to watch and listen to the things you do in the classroom. I will then ask you some questions about yourself and how you see school. It is up to you whether you want to participate in my project or not.

With your teacher I will look at your classroom records, and I will take notes on how you have been doing in class. I will then watch you in your learning activities in the classroom, taking notes about what you do and how you do it. During this time everything will stay exactly the same – nothing will change for you in class. After I have finished this, I will ask you some questions in private about you think about yourself. This will be very quick, and you only have to answer yes or no to my questions.

All the children that have been chosen for this project will be given a code name so that no one will know your real name, your Mum/Dad's (as applicable) or teacher's names, or the school you go to. All the information I collect will be kept in a locked cabinet, and I will destroy it when I am finished writing up my project.

Your Mum or Dad (as applicable) and teacher have also been asked to help. If you have any questions you can talk to me, your Mum or Dad, or your teacher. It is fine if you change your mind about being part of this project at any time - just let your Mum or Dad (as applicable), teacher or me know.

If you think you'd like to take part in this study, please fill out the attached consent form and ask your Mum or Dad (as applicable) to complete theirs too. Thank you for thinking about helping me with this project!

Taryn Lewis

An investigation into the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

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Information sheet for Parents/Caregivers of Twice Exceptional Students

My name is Taryn Lewis, and I am a student in the Child and Family programme at the University of Canterbury. I am currently competing my Masters thesis, and I am wanting to study twice exceptional students' classroom interactions with their teachers and peers. I will also ask the selected students, via a self-concept questionnaire, some questions regarding their perceptions of themselves in relation to their behaviour, learning, social relationships and happiness.

The purpose of my research project is to observe and describe the interactions between twice exceptional students (which are defined as those who are gifted with attention, behavior or learning difficulties) and their teachers and peers within the classroom. This involves coming into your child's classroom and observing them for twelve 30 minute periods over approximately two weeks. I will be recording the interactions your child has with their teacher and with their peers during these periods. Following the observations I will go through a brief self-concept questionnaire with your child to find out how they feel about themselves in general. I will also request access to your child's academic records through their teacher, so I can align their academic achievement with their teacher/peer interactions. The complete project should take around three to four weeks to complete, and is designed to fit with your child's school schedule. It is expected that classroom teaching practices and activities will be uninterrupted, and I will try to be as unobtrusive as possible within the classroom.

Please note that participation in this research project is entirely voluntary. If you allow your child to participate, you and your child have the right to withdraw from the study at any point until the end of October. If you choose to withdraw, I will remove any information relating to your child within practical limits.

I will take particular care to ensure the confidentiality of all data gathered for this study. I will also take care to ensure the anonymity of you, your child and other children in their class, their school and their teacher in any publication(s) of the findings. All data will be securely stored in password protected facilities and locked storage at the University of Canterbury for five years following the study before being destroyed.

Every family and teacher participating in the study will receive a report of my findings early in 2015. The results of this study may be used in a conference presentation and/or published articles(s). If you have any questions about the study, please feel free to contact me or my Senior Supervisor, Gaye Tyler-Merrick. If you have a complaint about the study, you may contact my supervisor or the Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree for your child to participate in this study, please complete the attached consent form and send back to me in the self-addressed envelope provided. Thank you very much for considering contributing to my Master's thesis study.

Yours sincerely,

Taryn Lewis

taryn.lewis@pg.canterbury.ac.nz

Supervisors:

Gaye Tyler-Merrick

Phone: 03 364 2987 #44380

Email: gaye.tylermerrick@canterbury.ac.nz

Dr. Laurie McLay

Phone: 03 364 2987 #7176

Email: laurie.mclay@canterbury.ac.nz

An investigation into the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

---

Information sheet for Teachers

My name is Taryn Lewis, and I am a student in the Child and Family programme at the University of Canterbury. I am currently competing my Masters thesis, and I am wanting to study twice exceptional students' classroom interactions with their teachers and peers. . I will also ask the selected students, via a self-concept questionnaire, some questions regarding their perceptions of themselves in relation to their behaviour, learning, social relationships and happiness.

The purpose of my research project is to observe and describe the interactions between twice exceptional students (which are defined as those who are gifted with attention, behavior or learning difficulties) and their teachers and peers within the classroom. I will be observing one 2E student and one typically developing student in your classroom. This involves coming into the classroom and observing the students for twelve 30 minute periods over approximately two weeks. The timing of these observations will be worked out in collaboration with you, to ensure your normal teaching practices are not disturbed. I will be recording the interactions the child has with you and their peers during these observation periods.

Following the observations I will go through a brief self-concept questionnaire with the child to find out how they feel about themselves in general. I will also request access to the academic records of the 2E and comparison student, so I can align their academic achievement with their teacher/peer interactions. The complete project should take around three to four weeks to complete, and is designed to fit with your classroom schedule. It is expected that classroom teaching practices and activities will be uninterrupted, and I will try to be as unobtrusive as possible within the classroom. I am not assessing your teaching practices in any way, just recording the interactions the child has with you and their peers within the classroom.

Please note that participation in this research project is entirely voluntary. If choose to participate, you have the right to withdraw from the study at any point until the end of October. If you do choose to withdraw, I will remove any information relating to you within practical limits.

I will take particular care to ensure the confidentiality of all data gathered for this study. I will also take care to ensure the anonymity of you, the participating children and the school in any publication(s) of the findings. All data will be securely stored in password protected facilities and locked storage at the University of Canterbury for five years following the study before being destroyed.

Every family and teacher participating in the study will receive a report of my findings early in 2015. The results of this study may be used in a conference presentation and/or published articles(s). If you have any questions about the study, please feel free to contact me or my Senior Supervisor, Gaye Tyler-Merrick. If you have a complaint about the study, you may contact my supervisor or the Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in this study, please complete the attached consent form and send back to me in the self-addressed envelope provided. The children involved and their parents have already completed their own consent forms. Thank you very much for considering contributing to my Master's thesis study.

Yours sincerely,

Taryn Lewis

taryn.lewis@pg.canterbury.ac.nz

Supervisors:

Gaye Tyler-Merrick

Phone: 03 364 2987 #44380

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Dr. Laurie McLay

Phone: 03 364 2987 #7176

Email: laurie.mclay@canterbury.ac.nz

An investigation into the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

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Information sheet for the Principal

My name is Taryn Lewis, and I am a student in the Child and Family programme at the University of Canterbury. I am currently competing my Masters thesis, and am wanting to study twice exceptional students' classroom interactions with their teachers and peers. I will also look at the perceived self-concept of these students through a questionnaire.

The purpose of my research project is to observe and describe the interactions between twice exceptional students (which are defined as those who are gifted with attention, behavior or learning difficulties) and their teachers and peers within the classroom. I will be observing one 2E student and one typically developing student in the classroom. This involves coming into the classroom and observing the students for twelve 30 minute periods over approximately two weeks. The timing of these observations will be worked out in collaboration with the classroom teacher to ensure normal teaching practices are disturbed as little as possible. I will be recording the interactions the child has with their teacher and their peers during these periods.

Following the observations I will go through a brief self-concept questionnaire with the child to find out how they feel about themselves in general. I will also request access to the 2E and comparison student's academic records, so I can align their academic achievement with their teacher/peer interactions. The complete project should take around three to four weeks to complete, and is designed to fit with the child's normal classroom schedule. It is expected that classroom teaching practices and activities will be uninterrupted, and I will try to be as unobtrusive as possible within the classroom.

Please note that participation in this research project is entirely voluntary. If you allow this study to proceed, you have the right to withdraw the school, staff and children from the study at any point until the end of October. If you do choose to withdraw, I will remove any information relating to the school, staff or children within practical limits.

I will take particular care to ensure the confidentiality of all data gathered for this study. I will also take care to ensure the anonymity of you, your teachers and students any publication(s) of the findings. All data will be securely stored in password protected facilities and locked storage at the University of Canterbury for five years following the study before being destroyed.

Every family and teacher participating in the study will receive a report of my findings early in 2015. The results of this study may be used in a conference presentation and/or published articles(s). If you have any questions about the study, please feel free to contact me or my Senior Supervisor, Gaye Tyler-Merrick. If you have a complaint about the study, you may contact my supervisor or the Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-

ethics@canterbury.ac.nz).

If you agree for your school to participate in this study, please complete the attached consent form and send back to me in the self-addressed envelope provided. The classroom teacher will be provided with their own consent form also. Thank you very much for considering contributing to my Master's thesis study.

Yours sincerely,

Taryn Lewis

taryn.lewis@pg.canterbury.ac.nz

Supervisors:

Gaye Tyler-Merrick

Phone: 03 364 2987 #44380

Email: gaye.tyler-merrick@canterbury.ac.nz

Dr. Laurie McLay

Phone: 03 364 2987 #7176

Email: laurie.mclay@canterbury.ac.nz

An investigation into the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

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Information sheet for Parents/Caregivers of Comparison Students

My name is Taryn Lewis, and I am a student in the Child and Family programme at the University of Canterbury. I am currently competing my Masters thesis, and am wanting to study twice exceptional (see definition below) and typically developing student's classroom interactions with their teachers and peers. I will also look at the perceived self-concept of these and typically developing students through a questionnaire.

Your child has been randomly chosen as a typically developing student in the classroom of a twice exceptional student. The information gathered from your child will be used as comparison to the information gathered from a twice exceptional student.

The purpose of my research project is to observe and describe the interactions between twice exceptional students (which are defined as those who are gifted with attention, behavior or learning difficulties) and their teachers and peers (one of which is your child) within the classroom. This involves coming into your child's classroom and observing both students for twelve 30 minute periods over approximately two weeks. I will be recording the interactions your child has with their teacher and with their peers during these periods. Following the observations I will go through a brief self-concept questionnaire with your child to find out how they feel about themselves in general. I will also request access to your child's academic records, so I can align their academic achievement with their teacher/peer interactions. The complete project should take around three to four weeks to complete, and is designed to fit with your child's school schedule. It is expected that classroom teaching practices and activities will be uninterrupted, and I will try to be as unobtrusive as possible within the classroom.

Please note that participation in this research project is entirely voluntary. If you allow your child to participate, your child and you have the right to withdraw from the study at any point until the end of October. If you choose to withdraw, I will remove any information relating to your child within practical limits.

I will take particular care to ensure the confidentiality of all data gathered for this study. I will also take care to ensure the anonymity of you, your child and other children in their class, their school and their teacher any publication(s) of the findings. All data will be securely stored in password protected facilities and locked storage at the University of Canterbury for five years following the study before being destroyed.

Every family and teacher participating in the study will receive a report of my findings early in 2015. The results of this study may be used in a conference presentation and/or published articles(s). If you have any questions about the study, please feel free to contact

me or my Senior Supervisor, Gaye Tyler-Merrick. If you have a complaint about the study, you may contact my supervisor or the Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree for your child to participate in this study, please complete the attached consent form and send back to me in the self-addressed envelope provided. Thank you very much for considering contributing to my Master's thesis study.

Yours sincerely,

Taryn Lewis

taryn.lewis@pg.canterbury.ac.nz

Supervisors:

Gaye Tyler-Merrick

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Appendix C

Consent Forms

An investigation into the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

Child Consent Form

I have been told about Taryn's project by Taryn or my parent/s.

I am happy for Taryn to watch me in the classroom and take notes about what I say and do. I am happy to answer some yes/no questions with Taryn about how I feel about myself. I am happy for Taryn to look at my school records and take notes.

I know that any information collected about me will not be told to anyone else, and will be stored in a locked cabinet. Taryn will not use my name or the names of my parents, teachers, peers or school in the study or in any presentation or article she may write from her project. All information will be destroyed after it is written up. My Mum or Dad or caregiver will receive a written report of Taryn's findings early in 2015.

I understand I can change my mind at any time about being in this study and no one will mind.

I know that if I have any questions I can ask Taryn, my parent/caregiver or my teacher.

Child's name: _____

Signed: _____

Date: _____

Note: The child's parents will also receive an information sheet and will be required to complete their own consent form in addition to their child for the study to proceed.

Thank you for your time!

An investigation of the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

Parent/Caregiver Consent Form

I have been provided with a full explanation of this study and have been given an opportunity to ask questions.

I understand what will be required of my child if I agree for them to take part in this study.

I understand that participation in this study in voluntary, and that I or my child can choose to withdraw at any stage without penalty.

I understand that any information or opinions my child provides will be kept confidential to the researcher, and that any published or reported results will not identify me, my child, their peers, teacher or school.

I understand that all data collected for this study will be kept in locked and secure facilities at the University of Canterbury, and will be destroyed after five years.

I understand that I will receive a report on the findings of this research in early 2015 if I so choose. I have provided my email address below for this purpose.

I understand that if I require further information regarding this research I can contact Taryn Lewis. I can contact Taryn's supervisor (Gaye Tyler-Merrick) or the Chair of the University of Canterbury Educational Research Human Ethics Committee if I have any complaints or concerns.

By signing below, I agree to my child participating in this research study.

Name: _____

Relationship to child: _____

Date: _____

Signature: _____

Email address: _____

Please return this competed consent form to Taryn Lewis in the self-addressed envelope provided. Thank you for your participation in this research.

An investigation of the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

Teacher Consent Form

I have been provided with a full explanation of this study and have been given an opportunity to ask questions.

I understand what will be required of me if I agree to take part in this study.

I understand that participation in this study in voluntary, and that I can choose to withdraw at any stage without penalty.

I understand that any information or opinions I provide will be kept confidential to the researcher, and that any published or reported results will not identify me, my students or my school.

I understand that all data collected for this study will be kept in locked and secure facilities at the University of Canterbury, and will be destroyed after five years.

I understand that I will receive a report on the findings of this research in early 2015 if I so choose. I have provided my email address below for this purpose.

I understand that if I require further information regarding this research I can contact Taryn Lewis. I can contact Taryn's supervisor (Gaye Tyler-Merrick) or the Chair of the University of Canterbury Educational Research Human Ethics Committee if I have any complaints or concerns.

By signing below, I agree to participate in this research study.

Name: _____

School: _____

Date: _____

Signature: _____

Email address: _____

Please return this competed consent form to Taryn Lewis in the self-addressed envelope provided. Thank you for your participation in this research.

An investigation into the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

Principal Consent Form

I have been provided with a full explanation of this study and have been given an opportunity to ask questions.

I understand what will be required of my school if I agree to take part in this study.

I understand that participation in this study in voluntary, and that I can choose to withdraw my school at any stage without penalty.

I understand that any information or opinions provided will be kept confidential to the researcher, and that any published or reported results will not identify me, my students/staff or my school.

I understand that all data collected for this study will be kept in locked and secure facilities at the University of Canterbury, and will be destroyed after five years.

I understand that I will receive a report on the findings of this research in early 2015 if I so choose. I have provided my email address below for this purpose.

I understand that if I require further information regarding this research I can contact Taryn Lewis. I can contact Taryn's supervisor (Gaye Tyler-Merrick) or the Chair of the University of Canterbury Educational Research Human Ethics Committee if I have any complaints or concerns.

By signing below, I agree for my school to participate in this research study.

Name: _____

School: _____

Date: _____

Signature: _____

Email address: _____

Please return this competed consent form to Taryn Lewis in the self-addressed envelope provided. Thank you for your participation in this research.

Appendix D

Initial Interview Questions

An investigation of the classroom interactions of twice exceptional primary school students in comparison to their typically developing peers

Taryn Lewis, MA Thesis Research

Name (2E student):

Parent/Caregiver name & relationship to student:

Date of birth:

Ethnicity:

School:

Year level:

Teacher:

Student questions:

1. Tell me about how you get on at school with your work?
2. What do you find easy at school?
3. What do you find more difficult at school?
4. Tell me about your friends at school

Parental/Caregiver questions

1. Could you tell me about your child's academic experience at school so far?
2. Could you tell me about why you consider your child as 'gifted'? Have you obtained a formal diagnosis – if so, where and when?
3. Does your child face any academic challenges at school?
4. Could you tell me about how these challenges have affected your child's school experience?
5. Is there anything else you would like to share regarding your child's school experience so far?

Appendix E

Interval Recording Sheet for Teacher and Peer Interactions

Observation form

An Investigation into the Classroom Interactions of Twice Exceptional Primary School Students in Comparison to their Typical Peers

Names: _____ *Intervals = 10 sec + 5 sec recording*

School: _____ *Multiple interactions/responses = mark below code*

See attached coding schedule for coding information

Recording number: /4

2E/C	Activity	Interval	Interaction initiator	Interaction type	Respondent	Response	Comments
2E	W SD G Oth	1	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	2	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	3	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	4	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	5	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD	6	T P S	+V +Nv -V	T P S	+V +Nv -V	

	G Oth			-Nv 0v 0n NR Other		-Nv 0v 0n NR Other	
2E	W SD G Oth	7	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	8	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	9	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	10	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	11	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	12	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	13	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Ot	14	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	15	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	16	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	17	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	

C	W SD G Oth	18	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	19	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	20	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	21	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	22	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	23	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	24	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	25	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	26	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	27	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	28	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	29	T P S	+V +Nv -V -Nv	T P S	+V +Nv -V -Nv	

				0v 0n NR Other		0v 0n NR Other	
C	W SD G Oth	30	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	31	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	32	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	33	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	34	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	35	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	36	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	37	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	38	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	39	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	40	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD	41	T P S	+V +Nv -V	T P S	+V +Nv -V	

	G Oth			-Nv 0v 0n NR Other		-Nv 0v 0n NR Other	
C	W SD G Oth	42	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	43	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	44	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	45	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	46	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	47	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	48	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	49	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	50	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	51	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	52	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	

2E	W SD G Oth	53	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	54	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	55	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	56	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	57	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	58	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	59	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	60	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	61	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	62	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	63	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	64	T P S	+V +Nv -V -Nv	T P S	+V +Nv -V -Nv	

				0v 0n NR Other		0v 0n NR Other	
2E	W SD G Oth	65	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	66	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	67	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Ot	68	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	69	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	70	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	71	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	72	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	73	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	74	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	75	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD	76	T P S	+V +Nv -V	T P S	+V +Nv -V	

	G Oth			-Nv 0v 0n NR Other		-Nv 0v 0n NR Other	
2E	W SD G Ot	77	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	78	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	79	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	80	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	81	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	82	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	83	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	84	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	85	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	86	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	87	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	

C	W SD G Oth	88	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	89	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	90	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	91	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	92	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	93	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	94	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	95	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	96	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	97	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	98	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	99	T P S	+V +Nv -V -Nv	T P S	+V +Nv -V -Nv	

				0v 0n NR Other		0v 0n NR Other	
C	W SD G Oth	100	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	101	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	102	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	103	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	104	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	105	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	106	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	107	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	108	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	109	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	110	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD	111	T P S	+V +Nv -V	T P S	+V +Nv -V	

	G Oth			-Nv 0v 0n NR Other		-Nv 0v 0n NR Other	
C	W SD G Oth	112	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	113	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	114	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	115	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	116	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	117	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	118	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
2E	W SD G Oth	119	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	
C	W SD G Oth	120	T P S	+V +Nv -V -Nv 0v 0n NR Other	T P S	+V +Nv -V -Nv 0v 0n NR Other	